On the motion of Mr. KINGSMILL votes of thanks were accorded Messrs. Mault and Biggs for their papers.

The CHAIRMAN, in putting the resolution, regretted that Mr. Stephens, the Director of education, was not able to be present through pressure of work, but he had no doubt the paper, would receive full consideration in due course.

Mr. MAULT, in responding, said that he would spare no pains to forward the course of education in this respect. He understood that the Government had initiated some technical schools, under the direction of Mr. Charpentier, and he would be glad to present him with a set of models, which would illustrate the system he advocated in his paper.

The proceedings then terminated.

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## JULY, 1886.

The monthly meeting of the Royal Society was held on Tuesday evening, July 13. Mr. James Barnard in the chair.

The CHAIRMAN said he was sure they all deeply regretted the late sad railway accident that had taken place since the last meeting of the Society, one of the sufferers being their worthy hon. sec. (the Hon. J. W. Agnew); but he was pleased to learn that Dr. Agnew was in a fair way of recovery, and hoped that a few days would see him about again. (Applause.)

Messrs. W. Blanch Brain, F.S.S., G. S. Perrin (Conservator of Forests) were elected Fellows of the Society.

List of additions to the Library during the month of June :—

*Agricultural Gazette.*

Annals and magazines of Natural History, No. CI., May.

Appendix to the Statistics of New Zealand for the year 1884. A series of diagrams, showing the progress of the colony by increase of population, trade, live stock, cultivation, occupied holdings, etc.—From the Government.

Astronomical observations, 1882-5, Rousdon Observatory, Devon, made under the superintendence of C. E. Peck, M.A.—From the Society.

Athenæum, April.

Australian Mosses, enumerated by Mr. W. Mitten.—From Baron F. Von Mueller.

Bollètino della Societâ Geograpfica Italiana, serie II., vol. XI., April, 1886, Anno XX., Fasc. 4.—From the Society.

Bulletin de la Societa Imperiale des Naturalists de Moscow, Année 1885, Nos. 3 et 4.—From the Society.

Catalogue des Portraits de Voyageurs et de Géographes qui se trou vent dans les Albums de la Societe de Géographie a la date du 22 Novembre, 1885.—From the Society.

Fac similes of four old Charts of Australia.—From the Trustees Public Library, Melbourne.

*Geological Magazine*, May, 1886.

Imperial Federation, No. 5, Vol. 1, May 1886.—From the Editor.

Indian Meteorological Memoirs, Vol. III., Pt. 1, 1. The Rainfall of India, Vol. IV., Pt. 1.—From the Department.

Insects of the Fly River, New Guinea—"Coleoptera," by Wm. Macleay, F.L.S., etc.—From the Author.

Journal of the Royal Microscopical Society, Series II., Vol. 6, Pt. 2, April, 1886.—From the Society.

Journal of the Society of Arts, April.

List of Members of the Geological Society of Australia ; also a set of works in the Library of the Society.—From the Society.

Mémoires de la Sociètè Royala des Sciences de Liege, Deuxiéme Série, Tome XI.—From the Society.

Meteorologische Beobachtungen ausgeführt am Meteorologischen Observatorium der Landwirthschaftlichen Akademie.—From the Society.

Monthly notices of the Royal Astronomical Society. Vol. XLVI. No. 6. April, 1886.—From the Society.

Nature, April. Vol. XXXIII. 1886. Occasional papers on the Queensland Flora. By F. M. Bailey, F.L.S.—From the author.

On the Flexure of Meridian Instruments and the means available for eliminating its effects from star places. By Wm. Harkness.—From the author.

Proceedings of the Linnean Society of N.S. Wales, second series, Vol. I, Pt. 1.—From the Society.

Proceedings of the Canadian Institute, Toronto, third series. Vol. III. Fas. No. 3. February, 1886.—From the Society.

Records of the Geological Survey of India. Vol. XIX. Pt. 2. 1886.—From the Society.

Report of the second ordinary meeting of the Queensland branch of the Geographical Society of Australasia. March, 1886.—From the Society.

Report of the Technological Industrial and Sanitary Museum, Sydney, N.S.W. 1885.—From the Trustees.

Report on the progress and condition of the Botanic Gardens and Government plantations, Adelaide, during the year 1885.—From the Director.

Report of the Mining Register for the quarter ended 31st March, 1886, "The Goldfields of Victoria."—From the Department.

Statistics of the colony of New Zealand for the year 1885. Part III. Trade and Interchange.—From the Government.

Sociétié de Geographie, No. 7, 8.—From the Society.

Transactions of the Royal Historical Society. New series. Vol. III., Part II.—From the Society.

Transactions and Proceedings and Report of the Royal Society of South Australia. Vol. VIII. for 1884-5.—From the Society.

Victorian Naturalist. Vol. III., Nos. 1, 2, May and June, 1886. —From the Society.

PAPERS.

"Collection, Observation, and Identification of Mosses," by Mr. R.A. Bastow, F.L.S.—

The most favourable collecting grounds around the city of Hobart were mentioned, with the species most likely to be met with in those localities. The summit of Mount Wellington, the Ploughed Fields, the Springs, the Falls, St. Crispin's Well, Macrobie's Gully, Mount Rumney, and Kangaroo Point, were severally noticed. The manner of identification of the Genera by means of an illustrated key prepared by Mr. Bastow was made clear by an example. This key has been prepared specially as an introduction to the study of Tasmanian mosses, and is a new feature in the introductory portion of bryology. The Tasmanian mosses are the first in the botanical world to have been thus diagramatically arranged, so that the student may have all the genera before him on one sheet, so bracketed and arranged, that he can almost at once find out the genus of the specimen in hand. One species of each genus is represented, in its natural size, and as

it appears under the microscope with a 1½in. objective. The key also contains short generic description; these in conjunction with the list of Tasmanian genera, their authors, the English meanings of the generic names, and the habit of each genus, in the body of the paper, will afford assistance that has been long required in the pursuit of this branch of cryptogamic botany. Mr. Bastow must be congratulated on having completed a scheme which has cost him a great amount of labour, and which ought to be thoroughly appreciated by those for whose benefit it has been worked out. Several beautiful specimens of mosses, mounted in glycerine jelly, were exhibited under the microscope, and by the use of the spot lens, the natural colours of the plants were vividly brought out.

### THE DISCOVERY OF AUSTRALIA BY THE PORTUGUESE.

In reference to the presentation of photo-lithographs of four early charts of Australia, Mr. J. R. McClymont made the following remarks:—

"The maps lying on the table are photo-lithographs, in part or whole, of four MS. maps of the sixteenth century, taken from the originals in the British Museum at the instance of the Trustees of the Melbourne, Sydney, and Adelaide Public Libraries.

"In order that you may fully understand their place and significance in the geographical history of Australia, it is necessary to revert to a period considerably anterior to that of their execution.

"From very early times there existed a belief in a southern continent, as Mr. Major shows by references to Manilius, Aratus and Strabo. Pomponius Mela, writing in the first century after Christ, inquires whether Taprobana, to the south of India, be an island or the commencement of a second world (*insula aut prima pars alterius orbis*) and Ptolemy (2nd century) places a *terra incognita* to the south of the Indian Ocean, connecting Asia with Africa, and forming that ocean into an inland sea. The myth may have arisen from the supposed necessity for a southern tract of land to counterbalance the continents of the northern hemisphere, supported in later times by the knowledge of the southward extension of Asia in the Malay Peninsula and adjacent island of Sumatra. The geography of Ptolemy was in general use until the voyages of the Spaniards and the Portuguese to the south gave a new form to the ancient conception of the southern hemisphere. But even after their discoveries, the Ptolemaic conception influenced the representation of the southern lands.

"About the year 1531 a new departure is made by the map-makers, some of whom now show the *Terra Australis* with a vast extension to the northward in a position roughly approximating to that of Australia as it is known to us. This appears, for example, on a woodcut map of the year 1531, by the French geographer, Oronce Finé, published in the *Nova Orbis* of Grynæus (Parisiis, 1532.) 'The globe of Orontius Finé, of Dauphiny,' writes Mr. Petherick, 'one of the best records of the geographical knowledge of that date, shows the Indian and Pacific Oceans, almost as one, with what might be intended for the north coast of Australia as low as the tropic of Capricorn and about half-way between Africa and South America.' *Mel. Rev. ix. 158.* These outlines have no resemblance to the real Australia. The map has the legend '*Terra Australis recenter inventa sed nondum plene cognita.*' There is also in a polyglot bible by Areas Montanus, vol. III, of the date 1571, and printed at Antwerp, a mappe-monde, showing a curved line indicating the north part of an unexplored land exactly in the position of the north of Australia, distinctly implying an imperfect discovery.' Major's *Prince Henry*, p. 295. In other engraved maps of that century, the coast line of the *Terra Australis*, beginning in *Tierra del Fuego*, trends westward in the same latitude until it reaches the longitude of

New Zealand, where it curves northward and westward till it attains a latitude more or less corresponding with that of the north of Australia. Sometimes New Guinea is connected with the *Terra Australis*; in other maps, they are separated. The coast-line finally recedes southward and westward to the same high la itude in which it originated.

"Two sources are clearly indicated whence this augmentation took their rise. First, we must look to the pages of Marco Polo, who tells us that by steering a course between south and south-west from Java for seven hundred miles, 'you fall in with two islands, the larger of which is named Sondur, and the other Kondur. Both being uninhabited, it is unnecessary to say more respecting them. Having run the distance of fifty (or five hundred) miles, from these islands, in a south-easterly direction, you reach an extensive and rich province, that forms a part of the main land, and is named Locach, (*iii. 7.*) It has been shown that 'Java' was erroneously introduced into the text as the point of departure, it should have read 'Champa,'—the ancient name of a kingdom which embraced the coast from Tongking to Cambodia. Colonel Yule shows Locach to have been Lo-kok, the lower part of what is now Siam; Sondur and Condur were the Pulo Condore Islands. The cartographers of that age, however, implicitly following the text of Marco Polo, placed these names upon the northern part of the *terra australis*, and, in their striving after accurate detail, complicated the ancient error. The other source to which I allude, is, of course, the discovery of Magellan in 1520, as indeed appears from the inscription on one of the maps, that of Ortelius (1587); 'Hanc continentem australem nonulli Magellanicam regionem ab ejus inventore nuncupant.' Whether a third source of information may not have been drawn from is a question to which I shall revert further on.

"Although these engraved maps are less correct than certain MS. maps, the fac-similes of which lie before us, the latter are the earlier. They differ from the engraved maps chiefly in three points. First, that in one of them at least the Southern land is shown independently of any connection with the supposed Antarctic continent, or with Magellan's *Tierra del Fuego*; secondly, that the outlines are no longer vague curves but are definitely suggestive of actual observation; and thirdly, that the bays, capes, and islands bear significant names, and that in the Portuguese language or a Gallicised form of it.

"There are eight of these maps bearing the names of French cartographers although apparently copied from a Portuguese original, and they may be catalogued as follows:—

1. Map of the world on a plane projection. Anonymous. As it bears his arms, it was probably executed in the time of Francis, I., for his son the Dauphin, afterwards Henry, II. [1530 ?] In the British Museum.

2. Map of the world in hemispheres in a work, 'The Book of Idrography' dedicated to Henry VIII. by Jean Rotz, 1542. In the British Museum.

3. Map of a part of Asia from Cape Comorin to Aimoey in China. In the same volume.

4. Map in a hydrographic atlas bearing the name of Nicholas Vallard, Dieppe, and the date 1547. In the library of Sir Thomas Phillips, Bart., Middle Hill, England.

5. Mappemonde painted on parchment by order of Henry II., King of France.

6. Mappemonde made by Pierre Desceliers, of Arques, 1550. In the British Museum.

7. Map drawn by Guillaume le Testu in 1555. In a portolano at the Depôt de la Guerre in Paris.

8. Mappemonde by Nicholas Desliens, of Dieppe, 1566. In the Bibliothèque Nationale in Paris.

"All of these agree in the main in their representations of a vast country separated by a narrow strait from the Island of Java, and on which is inscribed the name 'The Londe of Java,' or 'Jave la Grande.'

"Mr. Major suggests three questions in connection with these maps of Java. First--Are their points of resemblance to the maps of Australia sufficiently striking to justify us in believing that the originals whence they were taken were based on actual discoveries? Secondly—If so, who were the discoverers? And, thirdly, at what date were the discoveries made?

"Had we only the map of Desceliers to guide us we would hardly be justified in saying that anything further was represented than the *Terra Australis* of the myths, for in that map we find the fictitious Southern Continent shown in very much the same way as in the engraved maps of which I have been speaking, and in it the western coast line of what might be supposed to denote Australia, is carried so far to the south as to suggest a merely hypothetical country. Turning, however, to the Dauphin map and that of Rotz in hemispheres, the matter assumes a different aspect. In the former it is true the coast lines of Jave la Grande are produced far south of the latitude of Australia, but they cease to be definite or suggestive of actual physical features on the west side at a latitude exactly corresponding with that of the south-western limit of Australia proper. In the map of Rotz they cease entirely in that latitude. The eastern coasts are much more perplexing. I will only say at present that the utmost recognisable limit towards the south is in 45°, or nearly the latitude of the south of Tasmania. Both coasts reach to about 10° S., in the northern direction.

"As might be expected, the longtitude is much less exact. Maury tells us, in his chapter on the *influence of the gulf stream upon climates and commerce*, that it was not unusual at the end of the last century for sailors crossing the Atlantic to be 6°, 8°, or 10° out of their reckoning in regard of longitude in as many days at sea. It can hardly then be matter of wonder if those navigators of the sixteenth century were as many degrees out as they had been *months* at sea. On the west side there is a deficiency of about 11°,—126° E. of the Cape Verde Islands instead of 137°. On the east side is an excess of about 9°,—187° E. of these islands instead of 178°. Adding the two errors we find that Jave la Grande is credited with 20° too many of longitudinal extent.

"It may be noted here that all this coast line cannot have resulted from one voyage. Hence the fact of an error of excess on one side of the map being supplemented by an error of the opposite character on the other side need excite no surprise. The maximum error is one of 11°, which, in regard to longitude, must be considered as trifling for that period.

"We have next to consider the contour of these coasts as compared with that of Australia. It should be remembered that, in all probability, the originals were mere flying sketches of what was seen of the coast from weather-beaten ships, and made no pretension to accurate survey. It is very much as if two of us, never having seen a map of Tasmania and ignorant of its insular character, were to be cast, the one on its east, the other on its west coast; were, in passing along, to jot down its outlines as they appeared to us; and as if these sketches were to fall into the hands of some mapmaker on the other side of the world to be elaborated into a map, and placed in proper position relatively to the other countries of the globe. We may safely say that these outlines of Jave la Grande bear as great a resemblance to the Australian coasts as our hypothetical map of Tasmania would do to the

coasts of this island. As a matter of fact, the outlines in question resemble Australia quite as much as those of South America in some of these maps resemble the South America of our modern atlases. There is one wide divergence from approximate similiarity in the south-east corner of the maps—a divergence which, as I think, has not so far been adequately dealt with, and with which, as I hope to deal with it on a future occasion, I shall not occupy your time at present.

"Finally, mark the position of Jave la Grande relatively to the other known continents and islands, and you will observe that it holds the place of the true Australia. An exception is its relation to the Malay Archipelago, for it is placed immediately to the south of Java, Flores, and Timor. This arose partly from the errors in longitude already alluded to, partly from the tendency to unite all imperfectly discovered lands in the Southern Ocean into one southern continent,—a survival of the old Ptolemaic teaching.

"Assuming then as proved that these maps are based on actual discovery, we have next to enquire who were the discoverers. On this point we are fortunate in having independent testimony. On the same map of Mercator, of the date 1569, on which occur the misunderstood extracts from Marco Polo applied to one portion of the *Terra Australis*, such as 'Beach provincia aurifera,' 'Maletur regnum scatens aromatibus,' occurs also on another portion, to the south of Africa, this remarkable inscription—'Psitacorum regio sic a Lusitanis hûc libegio vento appulsis, cum Callicutum peterent appellata propter earum avium multitudinem. Porro cum hujus terræ littus ad 2000 miliarium prosequuti essent, necdum tamen finem invenerunt, inde australem continentem attigisse indubitatum est.' This inscription is supported by a similar one which occurs on a map of the antarctic hemisphere in the *Speculum Orbis* of C. de Judæis, Antwerp, 1592, on that part of the *Terra Australis* opposite the Cape of Good Hope—'Lusitani, bonae spei legentes capitis promontorium, hanc terram austrum versus extare viderunt, sed nondum imploravere.' The source whence this information was derived is that to which I alluded in saying that the engraved maps of the sixteenth century were not indebted exclusively to Marco Polo and Magellan for their delineation of the *Terra Australis*. We gather from these inscriptions that the Portuguese on their way to India by the Cape of Good Hope were driven by a W., or more accurately W.S.W., wind (Libs) on the western coast of Australia which they followed for 2000 miles. The region between the Cape and Australia is now ascertained to be a well marked region of cyclones, with a prevailing direction from W.N.W. 'Within 20 years,' writes Mr. Petherick, 'from the departure of Vasco da Gama (1497), thirty-three fleets, composed of 220 ships of war, had been sent out from Lisbon to the East.' *Athenaeum*, June 28, 1884. It would not be strange if some of these vessels fell in with westerly storms of such violence as to drive them into Australian waters.

"The map of Desliens is in one respect of paramount importance, for it places the flags of the various nations on the lands discovered by their seamen, and on Jave la Grande it places the flag of Portugal. It may well be asked whether this be not the one link wanting to connect these MS. maps with the chance discovery so briefly but circumstantially narrated by Mercator.

"Lastly, as to the date. This, in default of information, cannot be fixed with accuracy, but may fall between the years 1500,—the date of the Portuguese expedition toIndia following that of Vasco da Gama—and 1536, the latest probable date of the earliest of these maps.

"There is one other matter to which I will briefly allude before closing. A great deal has been said about the disappearance of the original drawings from which these maps of Jave la Grande were constructed, and

about the silence of Portuguese historiographers concerning the discovery, and these facts have generally been attributed to a desire on the part of the Portuguese to conceal their discovery from the Spaniards for fear of interference with their trade. A similar desire for concealment has been attributed on similar grounds to the Dutch, and has been sufficiently disproved. But there seems to have been no difficulty on the part of individuals who were really interested in the matter to obtain access to the original drawings, or to learn such details as were to be learnt regarding the discovery. Seven pilot-cartographers in France, Mercator, and others in Holland, taking a geographer's interest in a new discovery, found out, apparently, all they could know about it. The discovery was one of little interest to the Portuguese, whose only object was to discover fresh fields for their commerce, or to find better paths for their fleets. Australia was no field for commerce, the Australian route no route for their Indian fleets. Wytfliet, writing in 1598, says that after one voyage and another that route was deserted, and the country was seldom visited, except when sailors were driven thither by storms. As early as the days of Marco Polo, and at intervals ever since, the inhabitants have been characterised as cruel, and the shores as inhospitable, and no trade is said to have been practicable with the natives of that country. Hence the discovery was only regarded as important by map-makers, who probably threw aside the original charts as soon as they had incorporated them in their maps, or if these charts remained in Lisbon up to the time of the great earthquake, they may have then been destroyed, Their loss is not unique. What has become of the majority of the drawings from which the map of Tasman was constructed 100 years later? I do not say that a political motive may not have sealed the lips of the historiographers, although the reasons I have given as conducing to render unimportant the discovery of Jave la Grande would operate in their case also. In those days it was not uncommon for a ship to be blown upon an unknown and unlocated coast."

Mr. McClymont said that his remarks must not be regarded in the light of an original paper, as he had only followed in the lines laid down by Mr. Major in his painstaking work. He would be gratified if the acquisition of these maps, or anything he or any other member might say on the subject could awaken an interest in the subject of historical geography, which suffered from neglect. He had been surprised at the ignorance respecting Tasmanian discovery exhibited by all classes of the community. He thought the maps now acquired might very well form the nucleus of a Map Department in the Society's Library.

Mr. C. T. BELSTEAD, after alluding to the value of the key to the "Tasmanian Mosses," and the paper by Mr. Bastow, as also to the very interesting remarks by Mr. J. R. McClymont, proposed the usual vote of thanks, which was seconded by Lieut. BEDDOME, and supported by the CHAIRMAN. The proceedings then terminated.

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## AUGUST, 1886.

The monthly meeting of this society was held in the Society's rooms last evening, August 10, Mr. James Barnard, V.P., in the chair. Over 40 members were present and several visitors.

List of additions to the library during the month of July.

Annalen des K. K. Naturhistorischen Hofmuseums redigirt Von Dr. Franz Ritter Von Hauer, Band I., No. 2; Wien, 1882.—From the Society.